

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-13 and 15-19 are currently pending. Claim 14 has been canceled without prejudice; and Claims 1 and 17-19 have been amended by the present amendment. The changes to the claims are supported by the originally filed specification and do not add new matter.

In the outstanding Office Action Claims 1-12, 15, and 17-19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,657,362 to Giger et al. (hereinafter “the ‘362 patent”) in view of the Ohno-Machado et al. reference (“Modular Neural Networks for Medical Prognosis: Quantifying the Benefits of Combining Neural Networks for Survival Prediction”); Claims 13, 16, 18, and 19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the ‘362 patent and the Ohno-Machado et al. reference, further in view of U.S. Patent No. 6,282,305 to Huo et al. (hereinafter “the ‘305 patent”); and Claims 14, 18, and 19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the ‘362 patent and the Ohno-Machado et al. reference, further in view of Ravdin et al. (“A practical application of neural network analysis for predicting outcome of individual breast cancer patients”).

Amended Claim 1 is directed to a method of processing medical image data to determine a prognosis of recovery, comprising: (1) obtaining segmented image data of a portion of the medical image data corresponding to an abnormality; (2) extracting at least one abnormality feature from the segmented image data corresponding to the abnormality; and (3) determining the prognosis of recovery based on the extracted at least one abnormality feature, wherein the prognosis of recovery includes an indication of the likelihood of survival of a subject. Further, Claim 1 has been amended to incorporate a limitation recited in Claim 14.

In particular, amended Claim 1 clarifies that the determining step comprises applying the at least one abnormality feature to a classifier trained in relation to at least one abnormality feature obtained from at least one set of previously obtained medical data including medical image data and a set of truth indicators, the set of truth indicators including at least one of lymph node involvement, presence of metastatic disease, and presence of local recurrence.

Accordingly, the changes to Claim 1 are supported by the originally filed specification and do not add new matter. Further, Applicants respectfully submit that the changes to Claim 1 do not represent a new issue and should to be entered after final rejection.

Applicants respectfully submit that the rejection of Claim 1 is rendered moot by the present amendment to that claim. However, since Claim 1 has been amended to incorporate limitations recited in dependent Claim 14, Applicants will address the rejections cited in the rejection of Claim 14.

Regarding the rejection of Claim 14, the Office Action asserts that the ‘362 patent and the Ohno-Machado et al. reference discloses everything in Claim 14 with the exception of “using lymph node involvement as a truth indicator,” and relies on the Ravdin et al. reference to remedy that deficiency.

The ‘362 patent is directed to a method for enhancing visualization of a mammographic image including the steps of identifying in the image an anatomically dense portion of the image and processing the dense portion to produce a processed image having a more uniform density. As shown in Figure 1, the ‘362 patent discloses that the method includes the step of digitizing a mammogram, segmenting the border of the breast region, and performing a histogram analysis within a region of interest to ultimately determine the percentage of dense portions. However, as admitted in the outstanding Office Action, the ‘362 patent fails to disclose determining the prognosis of recovery based on at least one extracted abnormality feature, wherein the prognosis of recovery includes an indication of the

likelihood of survival of a subject, as recited in amended Claim 1. Further, as admitted in the outstanding Office Action, the ‘362 patent fails to disclose that the determining step includes applying at least one abnormality feature to a classifier trained in relation to the at least one abnormality feature obtained from at least one set of previously obtained medical data including medical image data and a set of truth indicators, the set of truth indicators including at least one of the lymph node involvement, presence of metastatic disease, and presence of local recurrence, as recited in amended Claim 1.

The Ohno-Machado et al. reference is directed to a neural network for predicting survival of patients with AIDS. In particular, the Ohno-Machado et al. reference discloses that the output of a neural network corresponds to the probability of survival in a given year, while inputs are values of demographic, clinical, and laboratory variables. However, as admitted in the outstanding Office Action, the Ohno-Machado et al. reference fails to disclose a determining step that includes applying at least one abnormality feature to a classifier trained in relation to the at least one abnormality feature and a set of truth indicators including at least one of lymph node involvement, presence of metastatic disease, and presence of local recurrence, as recited in amended Claim 1. In this regard, Applicants note that, contrary to the assertion in the Office Action on page 7, the Ohno-Machado et al. reference does not disclose truth indicators in Table 2. Rather, Table 2 is a list of independent variables that may serve as inputs to the neural network. The Ohno-Machado et al. reference discloses that the dependent or truth variable was death due to AIDS.¹

The Ravdin et al. reference is directed to a neural network that is used to predict outcomes for individual breast cancer patients. As shown in Table 2 and in Figure 2, the Ravdin et al. reference discloses that the input values to the neural network include age, tumor size, and the number of involved nodes. However, Applicants respectfully submit that

¹ See the materials and method section of the Ohno-Machado et al. reference.

the Ravdin et al. reference fails to disclose the step of determining the prognosis on recovery by applying at least one abnormality feature to a classifier trained in relation to the at least one abnormality feature and a set of truth indicators including at least one of lymph node involvement, presence of metastatic disease, and presence of local recurrence. Rather, as disclosed on page 289, the Ravdin et al. reference discloses that death is used as the truth indicator to train the neural network. The Ravdin et al. reference does not disclose that a lymph node involvement is used as a truth indicator. Rather, the number of involved nodes is used as an input to the neural network.

Thus, no matter how the teachings of the ‘362 patent, the Ohno-Machado et al. reference, and the Ravdin et al. reference are combined, the combination does not teach or suggest determining the prognosis of recovery by applying at least one abnormality feature to a classifier trained in relation to at least one abnormality feature obtained from at least one set of previously obtained medical data including medical image data and a set of truth indicators, the set of truth indicators including at least one of lymph node involvement, presence of metastatic disease, and presence of local recurrence, as recited in amended Claim 1. Accordingly, Applicants respectfully submit that amended Claim 1 (and all similar rejected dependent claims) patentably defines over any proper combination of the ‘362 patent, the Ohno-Machado et al. reference, and the Ravdin et al. reference.

Independent Claim 17 recites limitations analogous to the limitations recited in Claim 1. Moreover, Claim 17 has been amended in a manner analogous to the amendment to Claim 1. Accordingly, for reasons analogous to the reasons stated above for the patentability of Claim 1, Applicants respectfully submit that the rejection of Claim 17 is rendered moot and Claim 17 patentably defines over any proper combination of the ‘362 patent, the Ohno-Machado et al. reference, and the Ravdin et al. reference.

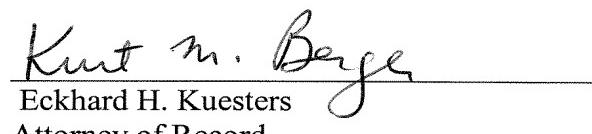
Regarding the rejection of dependent Claims 13 and 16 under 35 U.S.C. § 103, Applicants respectfully submit that the ‘305 patent fails to remedy the deficiencies of the ‘362 patent, the Ohno-Machado et al. reference, and the Ravdin et al. reference, as discussed above. Accordingly, Applicants respectfully submit that the rejections of Claims 13 and 16 are rendered moot by the present amendment to Claim 1.

Thus, it is respectfully submitted that independent Claims 1 and 17 (and all associated dependent claims) patentably define over any proper combination of the ‘362 patent, the ‘305 patent, the Ohno-Machado et al. reference, and the Ravdin et al. reference.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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